CLAIMS:

1. A method of centering a rotating body on a balancer, comprising:

mounting the rotating body on a spindle of the balancer;

obtaining a first measurement of at least one imbalance parameter of the rotating body on said spindle;

altering the mounting of the rotating body on said spindle;

obtaining a current measurement of said at least one imbalance parameter of the rotating body on said spindle;

calculating a difference between said first measurement and said current measurement for said at least one imbalance parameter;

comparing said calculated difference with at least one predetermined threshold amount to determine whether the rotating body is properly centered.

2. The method of centering a rotating body on a balancer as set forth in Claim 1, wherein said step of altering the mounting of the rotating body further comprises the steps of loosening said mounting of the rotating body on said spindle, and tightening said mounting of the rotating body on said spindle.

3. The method of centering a rotating body on a balancer as set forth in Claim 2, wherein said loosening step comprises loosening a wing nut; and said tightening step comprises tightening said wing nut.

4. The method of centering a rotating body on a balancer as set forth in Claim 2, wherein said step of altering the mounting of the rotating body further comprises the step of rotating the rotating body with respect to said spindle after loosening said mounting and before tightening said mounting.

5. The method of centering a rotating body on a balancer as set forth in Claim 1 further including the step of

repeating, until at least one calculated difference does not exceed said threshold amount, the steps of

(a) altering the mounting;

(b) obtaining a current measurement; and

(c) the additional step of calculating a difference between said current measurement and each previous measurement for said at least one imbalance parameter.

6. The method of centering a rotating body on a balancer as set forth in Claim 1 wherein said rotating body is a wheel assembly consisting of a wheel rim and a tire.

7. The method of centering a rotating body on a balancer as set forth in Claim 1 wherein said rotating body is a wheel rim.

8. The method of centering a rotating body on a balancer as set forth in Claim 1 further including the step of providing an indication if said calculated difference exceeds said threshold amount.

9. The method of centering a rotating body on a balancer as set forth in Claim 1 wherein said at least one imbalance parameter is an imbalance magnitude.

10. The method of centering a rotating body on a balancer as set forth in Claim 9 where said imbalance magnitude is an absolute imbalance magnitude selected from the set consisting of static imbalance magnitude and dynamic imbalance magnitude.

11. The method of centering a rotating body on a balance as set forth in Claim 9 where said imbalance magnitude is a computed imbalance correction weight amount.

12. The method of centering a rotating body on a balancer as set forth in Claim 1 wherein said at least one imbalance parameter is an imbalance angular location.

13. The method of centering a rotating body on a balancer as set forth in Claim 1 wherein said at least one imbalance parameter is a transducer output signal.

14. The method of Claim 1 for centering a rotating body on a balancer wherein the balancer is a wheel balancer.

15. The method of Claim 1 for centering a rotating body on a balancer wherein the rotating body is a vehicle wheel assembly.

16. A method of centering a wheel assembly on a wheel balancer, the wheel assembly including a wheel rim and a tire mounted on the wheel rim, comprising:

mounting the wheel assembly on a spindle of the wheel balancer;

obtaining a first measurement of runout of the rim-mounted tire on said spindle;

altering the mounting of the wheel assembly on said spindle;

obtaining a current measurement of said runout of the rim-mounted tire on said spindle;

calculating a difference between said first measurement and said current measurement for said runout;

comparing said calculated difference with a threshold amount to determine whether the wheel assembly is properly centered.

17. The method of centering a wheel assembly on a wheel balancer as set forth in Claim 16 further including the step of

repeating, until at least one calculated difference does not exceed said threshold amount, the steps of

(a) altering the mounting;

(b) obtaining a current measurement; and

the additional step of calculating a difference between said current measurement and each previous measurement for said runout.

18. The method of centering a wheel assembly on a wheel balancer as set forth in Claim 16 further including the step of providing an indication if said calculated difference exceeds said threshold amount.

19. The method of centering a wheel assembly on a wheel balancer as set forth in Claim 16 wherein said runout is a radial runout of an outer diameter of said rim-mounted tire.

20. The method of centering a wheel assembly on a wheel balancer as set forth in Claim 16 wherein said runout is a lateral runout of said rim-mounted tire.

21. A method for displaying, on a balancer, an imbalance of a rotating body, comprising the steps of:

establishing an imbalance threshold;

calculating an imbalance of the rotating body; and

providing a display of said calculated imbalance in relation to said established imbalance threshold to an operator.

22. The method of Claim 21 for displaying an imbalance of a rotating body wherein said imbalance threshold is related to one or more dimensional characteristics of the rotating body.

23. The method of Claim 21 for displaying an imbalance of a rotating body wherein said provided display is a non-numeric display.

24. The method of Claim 21 for displaying an imbalance of a rotating body wherein the step of providing further includes generating for display a scaled representation of both said calculated imbalance and said established imbalance threshold.

25. The method of Claim 21 for displaying an imbalance of a rotating body wherein the step of calculating an imbalance includes calculating an imbalance remaining in the rotating body following application of one or more known imbalance correction weights at known positions.

26. The method of Claim 25 for displaying an imbalance of a rotating body wherein said imbalance is a static imbalance.

27. The method of Claim 25 for displaying an imbalance of a rotating body wherein said imbalance is a dynamic imbalance.

28. A method for establishing an imbalance correction weight threshold level in a balancer system configured to measure one or more imbalance parameters of a rotating body, comprising the steps of:

identifying at least one dimension of the rotating body;

selecting an imbalance limit associated with each of said one or more imbalance parameters;

calculating an imbalance correction weight threshold level for each of said one or more imbalance parameters utilizing said identified at least one dimension and said selected associated imbalance limit.

29. The method of Claim 28 wherein the step of identifying at least one dimension includes identifying a diameter of the rotating body; and wherein the step of calculating includes utilizing said identified diameter and a selected imbalance limit associated with a static imbalance of said rotating body.

30. The method of Claim 29 wherein the step of calculating includes solving the equation

$$W_{BS} = F_{MAX} \Big/ \left(D/2\right)$$

where

- W_{BS} is the imbalance correction weight threshold level,
- F_{MAX} is the selected imbalance limit associated with a static imbalance of the rotating body, and
- D is the diameter of the correction weight circle of the rotating body.

31. The method of Claim 28 wherein the step of identifying at least one dimension includes identifying a diameter and an axial width for placing correction weights on the rotating body; and

wherein the step of calculating includes utilizing said identified diameter, said identified axial width, and a selected imbalance limit associated with a dynamic imbalance of said rotating body.

32. The method of Claim 31 wherein the step of calculating includes solving the equation

$$W_{BD} = M_{MAX} /(WxD/2)$$

where

- W_{BD} is the correction weight threshold level for dynamic imbalance ,
- M_{max} is the selected imbalance limit associated with a dynamic imbalance of the rotating body,
- W is the axial distance between the weight placement planes of the rotating body, and
- D is the diameter of the weight placement planes of the rotating body.

33. A method for establishing imbalance correction weight threshold levels in a balancer system configured to measure a static imbalance parameter and a dynamic imbalance parameter of a rotating body, comprising the steps of:

identifying a diameter of the rotating body;

identifying an axial width of the rotating body;

selecting an imbalance limit associated with said static imbalance parameter;

selecting an imbalance limit associated with said dynamic imbalance parameter;

calculating an imbalance correction weight threshold level for said static imbalance parameter utilizing said identified diameter and said selected imbalance limit associated with said static imbalance parameter;

calculating an imbalance correction weight threshold level for said dynamic imbalance parameter utilizing said identified diameter, said identified axial width, and a selected imbalance limit associated with said dynamic imbalance parameter.

34. A method for balancing a vehicle wheel utilizing the calculated imbalance correction weight threshold levels for static imbalance parameters and dynamic imbalance parameters as set forth in Claim 33, comprising the steps of:

obtaining a measurement of static and dynamic imbalance in the vehicle wheel;

determining static and dynamic imbalance correction weights for the vehicle wheel based upon said obtained measurements of static and dynamic imbalance;

selecting, responsive to said determined static imbalance correction weight exceeding said calculated imbalance correction weight threshold level for said static imbalance and to said determined dynamic imbalance correction weight being less than said calculated imbalance correction weight threshold level for said dynamic imbalance, a placement position for said static imbalance correction weight which reduces said measurement of dynamic imbalance in the vehicle wheel.

35. The method of Claim 34 for balancing a vehicle wheel wherein the step of selecting a placement position for said static imbalance correction weight includes:

calculating a static imbalance correction weight placement phase angle;

calculating an inner wheel plane dynamic imbalance correction weight placement phase angle;

calculating an outer wheel plane dynamic imbalance correction weight placement phase angle;

identifying one of said inner and outer wheel plane dynamic imbalance correction weight placement phase angles which is nearest to said static imbalance correction weight placement phase angle; and

placing said static imbalance correction weight at said calculated static imbalance correction weight placement phase angle in a wheel plane corresponding to the wheel plane of said nearest identified dynamic imbalance correction weight placement phase angle.

36. A method for establishing a static imbalance correction weight threshold level for a grouping of vehicle wheel assemblies having similar characteristics in a vehicle wheel balancer system configured to measure one or more imbalance parameters of a vehicle wheel assembly, comprising the steps of:

establishing an acceptable static imbalance correction weight threshold for a vehicle wheel assembly in the grouping of vehicle wheel assemblies, said vehicle wheel assembly having a known wheel rim diameter and a known tire diameter;

identifying a vehicle wheel rim diameter and a tire diameter for a vehicle wheel assembly in the grouping of vehicle wheel assemblies having an unknown imbalance;

calculating a static imbalance correction weight threshold level said vehicle wheel assembly having an unknown imbalance utilizing the equation

$$m_1 = \frac{m_0 D_{W0}}{D_{W1}} \left(\frac{D_{T1}}{D_{T0}} \right)^2$$

where

m_1 is the calculated static imbalance correction weight threshold level;

m_0 is the established acceptable static imbalance correction weight threshold level;

D_{W0} is the known wheel rim diameter;

D_{T0} is the known tire diameter;

D_{W1} is the identified wheel rim diameter for said vehicle wheel assembly having an unknown imbalance; and

D_{T1} is the identified tire diameter for said vehicle wheel assembly having an unknown imbalance.

37. A method for selecting an imbalance correction weight threshold level for a vehicle wheel assembly having an unknown imbalance in a vehicle wheel balancer system configured to measure one or more imbalance parameters of a vehicle wheel assembly, comprising the steps of:

identifying a grouping of vehicle wheel assemblies having similar characteristics to the vehicle wheel assembly having the unknown imbalance;

identifying an associated acceptable imbalance correction weight threshold curve for said identified grouping of vehicle wheel assemblies; and

determining a specific imbalance correction weight threshold for the vehicle wheel assembly having the unknown imbalance from said identified acceptable imbalance correction weight threshold curve and one or more characteristics of the vehicle wheel assembly having the unknown imbalance.

38. The method for selecting an imbalance correction weight threshold level of claim 37 wherein said specific imbalance correction weight threshold is a static imbalance correction weight threshold.

39. The method for selecting an imbalance correction weight threshold level of claim 37 wherein said specific imbalance correction weight threshold is a couple imbalance correction weight threshold.

40. A method for establishing a couple imbalance correction weight threshold level for a grouping of vehicle wheel assemblies having similar characteristics in a vehicle wheel balancer system configured to measure one or more imbalance parameters of a vehicle wheel assembly, comprising the steps of:

establishing an acceptable couple imbalance correction weight threshold for a vehicle wheel assembly in the grouping of vehicle wheel assemblies, said vehicle wheel assembly having a known wheel rim diameter, wheel rim width, and a known tire diameter;

identifying a vehicle wheel rim diameter, a wheel rim width, and a tire diameter for a vehicle wheel assembly in the grouping of vehicle wheel assemblies having an unknown imbalance;

calculating a couple imbalance correction weight threshold level said vehicle wheel assembly having an unknown imbalance utilizing the equation

$$w_1 = \frac{w_0 D_{w0}}{D_{w1}} \left(\frac{D_{T1}}{D_{T0}} \right)^2 \frac{L_0}{L_1}$$

where

w_1 is the calculated couple imbalance correction weight threshold level;

w_0 is the established acceptable couple imbalance correction weight threshold level;

D_{W0} is the known wheel rim diameter;

D_{T0} is the known tire diameter;

D_{W1} is the identified wheel rim diameter for said vehicle wheel assembly having an unknown imbalance;

D_{T1} is the identified tire diameter for said vehicle wheel assembly having an unknown imbalance;

L_0 is the known wheel rim width; and

L_1 is the identified wheel rim width for said vehicle wheel assembly having an unknown imbalance.